Asymmetric Supercapacitor for Long Duration Power Storage, Phase I

Completed Technology Project (2010 - 2010)

Project Introduction

When solar energy is used in aerospace applications, the necessary shadowed parts of the spatial orbit require energy storage for the craft/equipment to continue in operation. Batteries are used for the purpose currently, but with increasing power requirements, more efficient charge storage devices have to be developed. Energy storage technologies are expected to have improved energy density, speed, efficiency, or wide-temperature operation (-125

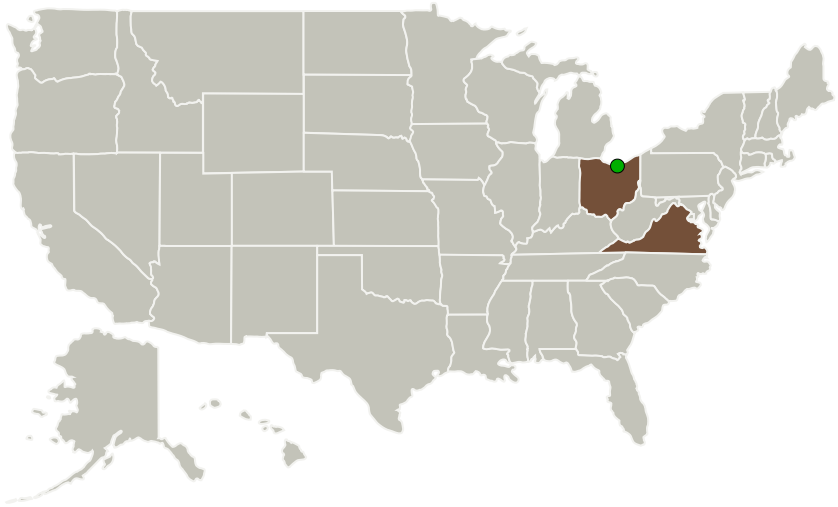
o

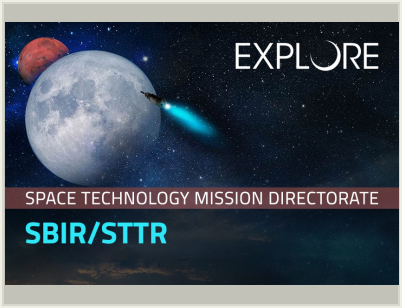
C to over 450

o

C) with a high cycling stability. Supercapacitors or ultra-capacitors are known to exhibit high capacity and power storage characteristics but they suffer from low energy density compared to rechargeable battery systems. Newly developed "asymmetric" capacitors are hybrid charge-storage devices in which a Faradaic, rechargeable battery-type electrode is combined with a non-Faradaic, electrochemical, double-layer type of electrode. It is possible to reach very high working voltage and high energy density by the right choice of electrode material. Materials Modification Inc. proposes to develop a novel nanocomposite material to function as the high-specific capacitance electrode in an asymmetric capacitor. Phase I will involve fabricating the electrode material and testing its electrochemical properties by standard means. Phase II will involve fine tuning the technology to fabricate actual supercapacitors for field testing.

Primary U.S. Work Locations and Key Partners





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Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
Materials Modification, Inc.	Lead Organization	Industry Small Disadvantaged Business (SDB)	Fairfax, Virginia
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Ohio	Virginia

Project Transitions

January 2010: Project Start

July 2010: Closed out

Closeout Summary: Asymmetric Supercapacitor for Long Duration Power Storage, Phase I Project Image

Closeout Documentation:

- Final Summary Chart Image*(https://techport.nasa.gov/file/138824)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Materials Modification, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

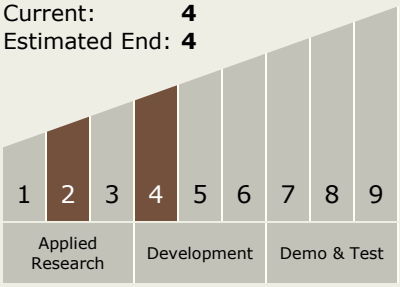
Carlos Torrez

Principal Investigator:

Tirumalai S Sudarshan

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX03 Aerospace Power and Energy Storage
  - TX03.2 Energy Storage
    - TX03.2.1 Electrochemical: Batteries

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System